

8. OPERATION AND MAINTENANCE PROGRAM

This chapter summarizes the programs and procedures used to ensure safe and reliable potable water to our customers. It includes a description of the management of the utility system in the county organizational structure; system operations; preventive maintenance; standard operating procedures; asset management and inventory; emergency response program; cross-connection control program; and record keeping.

8.1 MANAGEMENT AND PERSONNEL

8.1.1 Organizational Structure

Lewis County is a three commissioner form of government. Each county commissioner is elected to a four-year term. The county is divided into three districts of relatively equal population as determined by federal census every ten years. Five departments report to the county commissioners: Public Works, Community Development, Health & Social Services, Central Services and Fiscal/Budget.

8.1.2 Public Works

The maintenance and operation program of the water system is the responsibility of the Public Works department. Public Works is also responsible for county road operations & maintenance, traffic engineering, engineering services for capital projects, GIS, solid waste management, surveying and property management. Even though Department employees have their own specific duties in their “home” division/program, there is shifting and sharing of personnel and resources to manage and operate the water system. A description of the utility management under Public Works is best separated into three categories of work:

- Operations
- Engineering
- Fiscal

The Administrator of the water utility is the Director of Public Works. Assistance to the Administrator is provided in a bi-weekly workgroup forum with representation by operations, engineering, administrative and fiscal staff. This workgroup reviews and resolves issues that generally are outside of the scope of our SOP. Outcomes from the workgroup may be used to define practices, develop procedures and form policies

Operations

Daily operations and maintenance are carried out by the Certified Plant Operator under the supervision of the Area 3 Maintenance Supervisor. Although the Certified Plant Operator is fully capable of working independently, this arrangement is made to be consistent with county policies. This arrangement ensures that the Certified Plant Operator can get timely assistance and resources for specific maintenance activities and special projects. This arrangement also ensures personnel safety by having regular communication with other utility personnel.

The plant operator is our point person at the plant so additional responsibilities are: customer meter reads; water service installation; main break repairs; hydrant and valve testing &

maintenance; responding to work orders (locking or unlocking service meters, leak tests); vegetation clearing to keep meter boxes, hydrants and valves accessible; monitoring of the intake; maintenance of the facility premises; customer service; inspecting approved water projects; troubleshooting and other duties as assigned.

Daily operations of the plant operator are supervised by the Area 3 Maintenance Supervisor. The supervisor also fills in to respond to work orders and assembles work teams for specific maintenance activities and special projects. We have approved agreements for backup water treatment operators with a certified WTPO individual, Cowlitz County, City of Centralia and City of Winlock.

Engineering

The Utility Services Manager under the direction of the Director of Public Works manages programs and projects, provides project engineering, strategizes improvement opportunities, develops budgets, applies for funding, prepares reports and newsletters, prepares contracts and requests for services, and other assistance as needed. The manager also prepares and updates monitoring plans, standard operating procedures manual, and asset management inventory.

Administration

Administrative support is provided to the Utility by an Office Assistant and Office Manager, as needed. Personnel maintains records/information and assists the Utility Services Manager with various programs, tracks work orders, drafts correspondence, assists with special mailings, responds to customer requests on our toll free utility number, and bridges work between Public Works and Fiscal.

Fiscal

The Fiscal department prepares bimonthly customer billings, deals with payment issues, files liens on outstanding accounts, responds to customer requests on our toll free utility number and issues work orders. Work orders are primarily issued from Fiscal as they are the first responders to our toll free utility telephone line.

8.2 CERTIFICATION

Pursuant to Chapter 246-292 WAC, the utility must have certified operators. Certified personnel are required for positions that are in direct charge of a public water system or major segments of the system and are responsible for monitoring and improving water quality.

Due to the size and nature of our water service, we are required by DOH to have specific personnel certifications. The population served is less than 1,500 people. These certifications are summarized in Table 8.1.

TABLE 8.1 – REQUIRED PERSONNEL CERTIFICATIONS		
CERTIFICATION	STATUS	PERSONNEL
WDM03	Current	J. Strom
WTPO3	Current	J. Strom
WDM2	Current	F. Terry
WTPO1, WTPO3	Current, Pending	F. Terry
CCS	N/A	Contractor
BAT	N/A	Contractor

The Water Treatment System is required to have operators with a WTPO 3 certification and a WDM 2 certification. We are fully compliant with that requirement as our primary operator has both of those certifications. In addition, we currently have another individual on staff that holds a WDM 2 certification and will take the test for the WTPO 3 certification later this month (July 2016). We currently use a certified contractor for backflow assembly testing. We use the list of active certified Backflow Assembly Tester (BAT) and Cross-Connection Specialist (CCS) on the DOH website prior to calling for services. Our plant operator is pursuing CCS and WTPO3 certification. The cross-connection program is implemented by Professional Engineers registered in the State of Washington.

8.3 DAILY OPERATIONS AND PREVENTIVE MAINTENANCE

8.3.1 Standard Operating Procedures Manual

Because county staff tasked to manage and operate the Vader-Enchanted Valley water system work in different departments and divisions, a Standard Operating Procedures (SOP) Manual (see appendix L) was developed to provide guidance. The SOP outlines procedures for monitoring daily plant operations, processing work orders, opening and closing accounts, dealing with customer complaints, handling delinquent accounts, placing liens, repairing main breaks, reporting requirements to be in compliance, and other procedures foreseen in the operation and management of the utility. The SOP is revised periodically to reflect the use of new technology and revised procedures.

A maintenance schedule and summary of procedures are also included in the SOP Manual. The schedule is provided as Table 8.2.

TABLE 8.2 – RECOMMENDED MAINTENANCE SCHEDULE		
FREQUENCY	COMPONENT	INSPECTION AND MAINTENANCE
Daily	Chemical Feed Pumps	Check for operation, feed lines are not frayed and kinked.
Daily	Chemical Feed Tanks	Visually check solution levels, and make solutions if necessary.
Daily	Filters	Check floc characteristics above filter.
Daily	Turbidimeter	Visually check the flow through the turbidimeters. The desired flow rate should be in the range of 250-750 ml/min.
Daily	Turbidimeter	Check online meter reading against portable meter reading.

Daily	Valves	Visually check valves for operation and leaks.
Daily	Electric Panel/Motor Control Center (MCC)	Visually check unit for proper operation.
Daily	All Pump Mechanical Seals	Check seals for leakage.
FREQUENCY	COMPONENT	INSPECTION AND MAINTENANCE
Daily	Motors	Check motor bearing temperature. If bearings are running hot, consult motor manufacturer's instructions.
Daily	Online Chlorine Analyzer	Check indicator reagents.
Weekly	Motors	Clean oil, dust, dirt, water and chemicals from the exterior of motor. Make sure motor air intake and outlets (fan cooled motor) are unobstructed.
Weekly	pH Meter	Calibrate.
Weekly	Adsorption Media	Check condition, wash floc accumulation if necessary.
Weekly	Online Chlorine Analyzer	Check online meter reading against reliable portable water reading. Calibrate online meter if necessary.
Monthly	Portable Turbidimeter	Check standardization with Glex secondary standard.
Monthly	Alarms and Callout System	Test.
Monthly	Online Chlorine Analyzer	Clean colorimeter measuring cell with 19.2 N sulfuric acid.
Quarterly	Instrumentation	Calibrate.
Quarterly	Plant Controls	Check operations through one cycle. Test controller inputs (level switches and alarms), and check for proper Plant response.
Quarterly	Heater and Thermostat	Inspect and clean units.
Quarterly	Filter plant turbidimeters	Calibrate.
Every 3 Months or per Mgr	Turbidimeter	Calibrate unit. Drain and clean turbidimeter body, tubing and inlet.
Semi-Annually	Chemical Feed Tanks	Drain and clean.
Semi-Annually	Floc Tanks	Drain and clean.
Semi-Annually	Online Chlorine Analyzer	Replace pump tubing.
Semi-Annually	Fire Hydrants	Flush, exercise and measure flow.
Annually	Distribution System Valves	Inspect and exercise.
Annually	Blowoffs and Dead-end lines	Flush and inspect.
Annually	Chemical Feed Pumps	Calibrate.
Annually	Vertical Turbine Pump	Change oil and grease bearings.
Annually	Flow Meter	Clean and inspect propeller and bearing.
Annually	Filter Media	Check for "mudballs" or other solid accumulation.
Annually	Filter Media	Check filter for loss of media.
Annually	Chemical Pumps	Clean and service pumps.
Annually	Static Mixer	Clean mixer.
Annually	Blowers	Lubricate.
4-6 Years	Clear well and Reservoir	Conduct interior and exterior inspection for solids and structural integrity. Clean and correct structural problems if necessary.

5 Years	Reservoir	Pressure wash or clean exterior to remove buildup of dirt and moss.
10-15 Years	Reservoir	Inspect exterior and interior for painting or recoating

8.3.2 Supply Source

The Cowlitz River intake facility is visited on a weekly basis by the operator who checks intake and pump house, notes readings, inspects grounds for vandalism and maintenance, and performs general upkeep and maintenance.

8.3.3 Treatment Plant

Maintenance of the water treatment plant is very important in maintaining the level of water service in a water system. Our certified operator manages the treatment plant. Daily operations include: taking daily water quality samples; recording and completing daily and monthly reports; checking chemical feed systems; adjusting chemical feed rates as needed; and monitoring backwash cycle operations.

8.3.4 Storage

Reservoirs can be vulnerable to contamination in public water systems. Contaminants can enter the reservoir through cracks or openings at the event, overflow or drain screens. Vandalism can also compromise reservoir water quality.

The reservoir is highly visible and adjacent to the plant. Our operator observes water levels and conditions daily. The plant grounds are fenced with a locked gate and monitored. Vegetation is kept cleared from the reservoir to minimize vegetative litter on and around the reservoir, to maximize air flow and to maintain visibility.

8.3.5 Distribution System

Maintaining records of water main conditions and repair work can play a significant role in preventing water main breaks and emergency shutdowns. By documenting leaks and maintenance work on each pipe section, trends and patterns can be established and severe problems can be avoided. Lewis County keeps and maintains a GIS database of the system.

Dead-end water lines are susceptible to water quality problems and should be flushed to remove stagnant water, chlorine residual and any sediment that may have been deposited. Lewis County has this activity on an annual schedule along with a plan to construct blowoff assemblies or hydrants at dead-end lines.

Valves and fire hydrants are important water system components, and are necessary for water system control during emergencies, scheduled repairs and maintenance, and water main extensions. Quite often fire personnel, contractors and others who operate the system valves may inadvertently leave valves closed or partially open at the end of their project. A routine valve exercise program will ensure that normally open valves stay fully open. Exercising valves also helps in finding damaged valves. A routine hydrant flush-and-exercise program will also ensure that hydrant seals and components are in good shape.

Lewis County adopted policy in October 2010 to allow only authorized Lewis County personnel to operate the system valves and hydrants. The local fire district housed in city limits, Cowlitz-Lewis County Fire District #20, can operate fire hydrants for fire-fighting purposes; but filling of water tanks at the hydrants and exercising of hydrants are not allowed. A special metered standpipe was constructed in 2012 for the local fire district for use in cleaning equipment and filling tankers.

8.3.6 Service Meters

The utility uses manual read meters. Our operator notes the meter readings and forwards the information to our Fiscal division for billing. An automated meter reading system was considered in 2012 but deemed not cost effective due to the size of the customer base, initial startup and future maintenance costs of hardware and software, and lost opportunities to interact with customers.

However, the installation of a new billing system to go online in 2015 and of new service meters for the entire system in 2015 will simplify and expedite the time spent by all Utility personnel for bimonthly manual meter readings. The new software also can refigure reading routes to maximize efficiency, and is compatible with touch pad readers. The new service meters will be in gallons, thereby eliminating the use of cf in the Enchanted Valley service area.

8.4 EMERGENCY RESPONSE PROGRAM

DOH requires an emergency response program to be included in the operations program under WAC 246-290-415. The purpose of the emergency response program is to guide personnel through system malfunctions, natural disasters and other events affecting routine system operation.

It should be noted that there are other countywide emergency management related plans and efforts headed by the Lewis County Sheriff's Office Division of Emergency Management (Emergency Management). These are: "2010 Comprehensive Emergency Management Plan", by Lewis County Sheriff's Office, Division of Emergency Management; and "Lewis County Multi-Jurisdictional Hazard Mitigation Plan" adopted on July 26, 2010.

The emergency response program as required by DOH was developed to be consistent with other existing county efforts. The emergency response plan includes: a contingency plan; a vulnerability analysis; and emergency response procedures.

8.4.1 Contingency Plan

The contingency plan serves as a guide to Utility personnel for developing response procedures. An emergency roster is provided. Guidance is given for: determining priority services; notifying DOH; maintaining inventory of materials; and responding to protect public health or safety.

Emergency Roster

A current emergency roster is provided in Table 8.3. This roster is updated whenever there are changes and an updated version is kept in our SOP Manual.

TABLE 8.3 – EMERGENCY ROSTER			
PUBLIC WORKS DEPARTMENT CONTACT		PHONE	MOBILE
During Business Hours:	Public Works Office	360-740-1122	
	Water Treatment Plant	360-295-3225	360-520-2433
	Road Maint. Supervisor	360-785-3304	360-880-2605
	Utility Services Manager	360-740-2759	360-520-3164
After Business Hours:	Water On Call Person		360-520-2433
	Road Maint. Supervisor		360-880-2605
	PW Director		360-556-9093
	Utility Services Manager		360-520-3164
EMERGENCY 911			
During Business Hours:		911	
After Business Hours:	Immediate Response	360-740-1105	
	Non-Emergency (voice mail)	360-748-3921	
LEWIS COUNTY			
	Lewis County Alert	360-740-1151	
	Emergency Mgmt	360-740-1151	
	Health Dept Lab	360-740-1237	
	Sheriff	360-748-9286	
STATE			
WSDOH - SW REGION	Regional Engineer	360-236-3030	
WSDOH	After Hours Hotline	877-481-4901	
ECOLOGY	Spill Response	360-407-6300	
OTHER			
Burlington Northern RR	Trouble Reports	800-832-5452(Ext. 2)	
	Longview/Kelso	360-758-2361	
Castle Rock School District		360-501-2940	
City of Vader		360-295-3222	
CenturyLink	Area Office	360-736-9941 800-247-7285	
Cowlitz-Lewis County Fire District #20		360-295-0906	
Evergreen Rural Water		360-981-5736	
Lewis County PUD		360-748-9261	
Providence Hospital		360-736-2803	
Puget Sound Energy	Gas Division	360-736-3383 800-999-4964	
Utility Underground Locate Center		800-424-5555	

Inventory of Materials

Lewis County maintains a supply of frequently used materials to make emergency repairs. The supplies include the materials necessary for the size and type of pipe in the existing distribution system. To avoid a large collection of inventory, we will target and replace irregular pipe sizes and types with the major, commonly used sizes and types.

Other existing measures are: established accounts with local suppliers; interlocal agreements with Group A municipalities for shared resources; and updated vendor lists. A list of updated vendors is kept in our SOP Manual.

General Field Response

The initial response by Utility personnel to an emergency is to take prompt action to remove the threat to public health or safety. Where appropriate, bystanders may be warned, traffic diverted, impacted area isolated, material removed or other actions taken without further risk to personnel and the public.

Next, the Maintenance Supervisor is contacted and informed of the damage and apparent cause. The Maintenance Supervisor will send a crew to isolate the problem area or damaged facility, and further assess the problem to determine personnel, materials and equipment needed for correction. If needed, the Maintenance Supervisor may confer with the Utility Services Manager and Administrator as to the preferred corrective action and options.

Throughout the emergency, communication contact shall be kept between work crews, the Operator, Maintenance Supervisor, Utility Services Manager, the utility Administrator and other key participants to enhance coordination with the county comprehensive emergency management plan and to keep county administrators informed to issue public notifications. Specific Utility personnel have authority to issue Lewis County Alert notices and public notifications.

Severity of Emergencies

Emergencies usually have a wide range of severity. Defining categories of severity can aid in determining appropriate response actions. Knowing the severity of the emergency and being able to communicate it to others will help county personnel respond effectively.

The assessment of severity is made by the person in charge. For field situations, the assessment is usually made by Operations personnel with immediate communication to Engineering. For catastrophic disasters, these incidents may involve other county services outside of Public Works such as county Health Department, Sheriff's Office, Emergency Management, DOH, WSDOT and FEMA.

A description of four categories of emergencies is provided. The categories are as outlined in DOH publication #331-211, "Emergency Response Planning Guide for Public Water Systems, May 2003". Details of the response actions are outlined in the SOP. ODW must be notified for any emergency Level 2 thru 4.

LEVEL 1 - NORMAL/ROUTINE EMERGENCY

These situations are defined as ones that: can be resolved within 24 hours, will not jeopardize public health, or can be handled normally by utility personnel. Examples are:

- Service and customer line breaks.
- Short power outages.
- Minor mechanical problems in Intake and Plant.

LEVEL 2 – MINOR/ALERT EMERGENCY

These situations are defined as ones that: can cause minor disruption in supply, pose possible contamination to the point of coordination with DOH or issuance of a health advisory to customers, or will take up to 72 hours to resolve. Examples are:

- Disruption in supply such as a transmission line break or pump failure with a potential for backflow and loss of pressure.
- Inadequate storage to handle disruption in supply.
- An initial positive coliform or E. coli sample.
- An initial primary chemical contaminant sample.
- A minor act of vandalism.
- Noticeable and continuing decline of water supply.

LEVEL 3 – SIGNIFICANT EMERGENCY

These situations are defined as ones that: have significant mechanical or contamination problems that will disrupt water delivery to customers to the point of issuing a health advisory, or may need more than 72 hours to resolve. Examples are:

- A verified acute confirmed coliform MCL or E. coli/fecal positive sample requiring an immediate health advisory to customers.
- A confirmed sample of another primary contaminant requiring an immediate health advisory to customers.
- A loss or complete malfunction of the water treatment facilities for the surface water source, including chlorination.
- A major main break or system failure resulting in a water shortage or system shutdown.
- Vandalism or threat such as intrusion or damage to a system facility.
- An immediate threat to the public health of the customers and an advisory is required.

LEVEL 4 – CATASTROPHIC DISASTER/MAJOR EMERGENCY

These situations are defined as ones that: experience damage from major damage or contamination from a natural disaster, an accident or malicious act of intent; require immediate notification of law enforcement and local emergency management services; immediate issuance of health advisories and emergency declarations to protect public health; or take several days to weeks to resolve. Examples are:

- Hazards identified in Section 8.4.2.
- Contamination of water supply or system with biological or chemical agents.
- Spills or contaminant entry within 2000 ft of the water source.

8.4.2 Vulnerability Assessment

A comprehensive hazard assessment plan was adopted by several agencies in Lewis County. Two agencies associated with the Utility—Lewis County and the City of Vader—participated and adopted the “Lewis County Multi-Jurisdictional Hazard Mitigation Plan” in 2010 and 2011, respectively. This hazard assessment plan was made to comply with the Disaster Mitigation Act

of 2000. This Act was passed as a result of escalating disaster costs occurring throughout the United States.

The purpose of the hazard assessment plan was to:

- Identify hazards
- Assess the potential for loss associated with the hazards
- Assess the vulnerability of each participant/jurisdiction to different hazards
- Develop strategies to reduce these vulnerabilities.

The results of the hazards in the Hazard Assessment Plan and the likely impact on specific elements of the utility facilities are summarized in Table 8.4. The table also included the impact of disasters on the power supply to the water utility system. Power is used to operate the intake pumps, telemetry and treatment controls.

In any disaster Level 2 – 4, the Office of Drinking Water (ODW) must be notified.

TABLE 8.4 – POTENTIAL DISASTER EFFECTS						
HAZARD TYPE	POTENTIAL EFFECTS ON FACILITY TYPES:					
	SUPPLY SOURCE	INTAKE	TREATMENT PLANT	STORAGE	DISTRIBUTION SYSTEM	POWER SUPPLY
Dam Failure	X	X				
Debris Flow	X	X				
Drought	X					
Earthquake	X	X	X	X	X	X
Extreme Heat				X		X
Flooding	X	X	X			
Hailstorm						X
Ice/Snow Storm		X	X	X	X	X
Severe Windstorm		X	X			X
Volcanic Eruption	X	X	X			X
Wildfire	X	X	X			X
DISASTER TYPE						
Contamination of Water Supply	X				X	
Water Main Break					X	
Vandalism		X	X	X	X	X

Dam Failure

Description: Dam failures have the potential to affect short and long-term supplies. The abrupt release of sediment laden flows also could plug the intake.

Response: Lewis County Emergency Management is listed to be notified by Tacoma Power. Emergency Management will notify agencies and jurisdictions downstream of the dam. The impact to the plant would be minimal as the plant will call out when raw water turbidities are high, and the operator will shut the plant. Nonetheless, Operations should check the storage, raw water turbidity readings and intake facility. If time allows and conditions predict a long period

of high in-stream turbidity, personnel may consider removing the intake pump to avoid damage from high abrasive river flows.

Debris Flow

Description: Debris flow upstream of the intake has the potential to cause high in-stream turbidity.

Response: See the discussion for DAM FAILURE.

Drought

Description: Climate change with its extreme weather has a huge potential impact to our supply. Our surface water supply relies on snowfall and glacial storage.

Response: Operations will check storage and may change operations to optimize flows during times of higher dam releases. Utility will note trends and send public information to customers about water conservation. Utility may work with local jurisdictions to place water moratorium on new development, and implement water conservation measures. Utility may consider water purchase from other suppliers. Refer to the Water Shortage Response Plan in Appendix I.

Earthquake

Description: A major earthquake with a magnitude of 5.0 or greater on the Richter scale could disrupt intake, treatment, storage and distribution components of the system. Power failure and disruption to local roads could occur.

Response: Operation personnel should secure supplies and equipment to minimize falling, tipping and spillage. Operations will check above ground facilities for damage. Underground facilities may be susceptible to ground movement so Operations will check the system thoroughly for any unexplained drop in pressure, reduction in flow rate, pump failure, leakage and other signs of damage. It is possible that seismic activity may trigger dam failure and debris flow so responses to other hazards should be used: dam failure and debris flow. See the discussion for DAM FAILURE.

Operations should anticipate water use needs for fire-fighting.

Extreme Heat

Description: Water usage is generally higher in warm weather due to outdoor watering and fire-fighting so some water conservation measures may be warranted. Power usage may be higher in periods of extreme heat thereby raising the potential of power outages.

Response: Personnel should contact the Lewis County PUD to determine the nature, extent and expected duration of the power outage. The system capacity is adequate at average usage, but it should be considered with conditions (power, fire conditions, duration of periods of extreme heat) at the time. See the discussions about water conservation in DROUGHT.

Flooding

Description: Although the service area is not in a mapped FEMA floodplain, prior flooding of the Cowlitz River have caused high in-stream turbidity and damaged the intake pump. The source and cause of the flooding can eventually impact the supply. Flooding from sudden releases of melt water with no replenishment of the snowpack can lead to drought.

Response: See the discussions in DAM FAILURE and DROUGHT. Operations personnel should also ensure that equipment at the intake facility is tied down.

Hailstorm

Description: Western Washington has had some hailstorms but there is a possibility that hailstorms could increase in frequency and severity due to climate change with its extreme weather. Depending upon the duration and range of the hailstorm, it may disrupt the power system.

Response: See the discussion in EXTREME HEAT.

Ice/Snow Storm

Description: Ice and snow storms have the potential to affect all components of the system along with power failure. Severe cold weather can freeze water in the reservoir thus affecting the transmission system and water service to customers. Ice in the reservoir can also damage the tank.

Response: Water utilities in cold climates subject to long periods of freezing weather use heaters, circulation, aerators and agitators to keep water from freezing. These measures may be considered if climate and operational conditions warrant it. Treatment processes work best in a specified temperature range so personnel may modify operations to minimize risk of freezing or shut down plant. The distribution system meter vault should be pumped of standing water and above ground lines may be wrapped.

Severe Windstorm

Description: A severe windstorm can cause power failures and disrupt transportation and communication systems.

Response: See the discussion for EARTHQUAKE. Operations personnel should also ensure that equipment at the intake facility is tied down.

Volcanic Eruption

Description: Washington State has five active volcanos and another across the Columbia River so an eruption has a huge impact to our supply, intake and treatment components. The eruption of Mt. St. Helens on May 18, 1980 sent ash throughout Lewis County. Disruption of power was experienced.

Response: See the discussions for DAM FAILURE, EARTHQUAKE and EXTREME HEAT.

Wildfire

Description: Wildfire has the potential to alter the hydrologic response of the watershed resulting in high in-stream turbidity conditions. A wildfire within or near the service area will need water for fire-fighting.

Response: See the discussion for DAM FAILURE and EXTREME HEAT.

Contamination of Water Supply

Description: Contamination can occur in surface supplies and may be the result of man-made practices or natural occurrences. High in-stream turbidity can occur from the aforementioned disasters. Distribution contamination can also occur through back-siphonage.

Response: See Chapter 7, Source Water Protection, for watershed control measures; and Section 8.5 Cross Connection Control Program for back siphonage.

Water Main Break

Description: Water distribution main breaks could occur from any of the aforementioned disasters and material failure.

Response: Utility personnel will immediately find and isolate the damaged waterline section, report incident, get information to customers, repair and undertake measures to protect the health of our customers. Laminated maps of the water system complete with valves and hydrants, and a valve atlas are available at the plant, operator's rig and supervisor's rig. A procedure for water main break repairs is outlined in our SOP Manual.

Vandalism

Description: Vandalism can potentially affect the entire system from intake to distribution. In addition, power supply and control systems could be disrupted.

Response: The intake and plant facilities are gated, locked, lighted, set with alarms and security cameras, and booby trapped. Entrances are cleared to be visible on the roadway. Alarms are in place for power outage and control. The county 911 system has a list of personnel to contact after normal work hours.

8.4.3 Public Notification

The Utility uses the Lewis County Alert notification system for public information. The Lewis County Alert system is used to send critical communications to registered customers from evacuation notices to missing child alerts. We encourage customers to register and post this Alert service in every utility newsletter and bill. We use Lewis County Alert to notify customers of scheduled maintenance and repair work, emergencies (for disasters and those beyond Level 1), and situations that may affect water service. In the event of potential disasters in Table 8.4 that will last longer than 24 hours, we will also post notices at several community places. One main place is the Vader Lions Club's message board along 7th Street/SR 506. This board is very visible as 7th Street/SR 506 is the main thoroughfare.

8.5 CROSS CONNECTION CONTROL PROGRAM

8.5.1 Purpose

A cross-connection is any physical arrangement where the potable water supply is connected, directly or indirectly, to any liquid of unknown or unsafe quality. This includes any liquids that may contaminate the public water supply through backflow or reverse flow. There have been numerous incidents in which water systems have been contaminated by a cross-connection, resulting in serious injury and illness to the public.

Under WAC 246-290-490, Cross-Connection Control, utilities have the responsibility to protect the water user from contamination due to cross connections. The regulation also requires utilities to develop and implement a comprehensive program to control cross connections within the system. The purpose of the program is to protect the health of water consumers and the portability of the public water system by assuring:

- Inspection and regulation of plumbing in existing and proposed piping networks.
- Proper installation and surveillance of backflow prevention assemblies when actual or potential cross connections exist and cannot be regulated.

WAC 246-290-490 mandates a cross-connection control program (CCCP) for the purposes of establishing:

- Minimum cross-connection control operating policies
- Backflow prevention assembly installation practices
- Backflow prevention assembly testing procedures
- Enforcement authority.

8.5.2 Guidance

The CCCP is developed to comply with WAC 246-290-490 and the recommended guidance:

- Manual of Cross-Connection Control published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern CA (USC Manual).
- Cross-Connection Control Manual, Accepted Procedure and Practice published by the Pacific Northwest Section of the American Water Works Association (PNWS-AWWA Manual).
- Cross-Connection Control for Small Water Systems by DOH.

8.5.3 Program Elements

Specific issues have to be in an effective CCCP. WAC 246-290-490 outlines ten minimum elements to be in a CCCP.

Element 1: Legal Authority

The CCCP is outlined in this chapter and will be adopted with the approval of this WSP by the county commissioners. Title 13 of the Lewis County Code (LCC) lays out policies for:

- Violations and appeals (13.20.060 LCC)
- Application, review and approval (13.30.100 LCC)
- Violation of utility regulations (13.30.120 LCC)
- Cross Connection Control Program (13.30.150 LCC)
- Required inspections (13.30.400 LCC)
- Right-of-entry (13.30.410 LCC)
- Correction of unsafe conditions (13.30.500 LCC)
- Conditions of utility service (13.80.100 LCC).
- Backflow Prevention Requirements (13.80.100(6) LCC).

These policies provide authorization to implement the current cross-connection control program. Title 13 LCC is available in Appendix H.

Element 2: Hazard Assessment

Three existing cross-connection assemblies were identified in the 2008 WSP. These locations were: water treatment plant, local Little Crane Restaurant and City of Vader wastewater treatment plant (WWTP). The first two locations were addressed in March 2011: there is an air gap in the water plant and the soda machine at the local eatery uses bottled water. The backflow assembly at the local WWTP was deemed antiquated in July 2011. The City of Vader constructed a new backflow assembly and hot box in January 2013. Annual backflow assembly testing is required for the WWTP at the end of each calendar year. The date of the last testing for the City WWTP was November 2014.

To identify potential hazards, a water use questionnaire form is used. This form was developed following the guidelines in Appendix D in the DOH guidance document “Cross-Connection Control for Small Water Systems, March 2004”. This questionnaire form was distributed to existing customers in December 2013. We also have all new water customers complete a water use questionnaire for water service on developed and undeveloped properties.

Lewis County requires all new building development and land development activities in the service area to have a completed Public Water Availability Notification form. A copy is in Appendix J. This form shows that we are capable of providing water service to the proposed project site. As part of the approval process, the utility asks for a completed water service application and water use questionnaire. Written approval from the local land development authority is also required to ensure that the water service applicant met local land development approvals. If any backflow prevention assemblies are required, it is noted on our database and county land development permitting database, the information is forwarded to either the City or county building official, and required to be completed before water service is provided.

Element 3: Control

Additional control measures were taken by installing backflow assemblies adjacent to the service meters for the local WWTP in 2011 and fire district in 2012. All new commercial service connections are required to install backflow assemblies as a condition of water service. Utility personnel use the current DOH approved list of backflow assemblies available at the DOH website.

Meter setters for residential customers generally have a check valve, and these types are used as we perform repairs on service lines. As resources allow, we would like to construct customer shutoff valves and replace meter setters to have additional layers of protection. Whenever possible in repairing a customer line, we install a customer shutoff valve.

Element 4: CCS Personnel

Operations personnel performed CCS program tasks when the system was managed by the City of Vader. Training has been approved and CCS certification is encouraged for current operation personnel. We currently use a contract CCS specialist.

Element 5: Inspection

We notify customers of upcoming test and completion dates. A copy of our letter is attached in Appendix I. Inspection and testing will be by a DOH certified CCS or Backflow Assembly Tester (BAT). If inspections and reports are not completed, we discontinue water service.

Element 6: Quality Control Testing Program

Testing is performed by the customer. Our notification letter includes guidance to use DOH certified BAT contractors to inspect for proper installation and testing of the backflow control assemblies. DOH certified CCS will perform cross connection hazard evaluations, and application and installation of backflow prevention assemblies.

Element 7: Backflow Incident Response

In the event a backflow incident occurs due to human error, main break or power outage, we will follow procedures similar to a water main break as outlined in our SOP Manual. The following

steps will be taken when a backflow incident has occurred, and steps may be done concurrently depending upon the situation.

- Report incident and request assistance to the Administrator and supervisor.
- Assess situation.
- Investigate and find the source of the contamination.
- Depending upon the severity of the contamination, contact WSDOH.
- Isolate the contamination by closing valves but leave one valve open to maintain pressure in the isolated segment.
- Public Works will issue a Lewis County Alert to notify customers about the incident and to not use water.
- Find the source of the contamination, discontinue service to that customer and notify customer to complete corrective action.
- If appropriate, refer customers that may have consumed the contaminant or had their plumbing system contaminated to Lewis County Health, Building Division of the Lewis County Community Development Dept., and City of Vader.
- Formulate plan to clean the contaminated system consistent with the identified contaminant(s).
- Flush portions of the affected system.
- Disinfect the flushed portions of the system.
- Notify customers of completion by issuing another Lewis County Alert or door-to-door notice.

Most chemical or physical contaminants can be flushed from the system or customer's plumbing system with adequate flushing velocity. At times, flushing may not be adequate in systems where scale and corrosion deposits (e.g., tuberculation on old cast iron mains) provide a restriction to get adequate flushing velocity, or where chemical deposits or bacteriological slimes (biofilm) are present.

In these situations, other methods such as a foam swab (pig) or alteration of the chemical contaminant may be needed. An example of the latter method could be alteration through oxidation by using chlorination or addition of detergents.

To disinfect water mains using the "slug" or "continuous flow" method, a field unit should be used for chlorine injection. The field unit can be a chemical feed metering or proportioning pump for sodium hypochlorite.

When adding any chemical, including chlorine, to remove a contaminant from the system, it is important that the chemistry of the contaminant is understood. Adding the wrong chemical could make the contaminant more toxic or more difficult to remove from the distribution main.

It is advised to contact the regional DOH office to discuss the proposed methods for contaminant removal and disinfection prior to taking corrective action.

Element 8: Public Education

Information about cross-connection control is provided to our customers in newsletter and the latest water use questionnaire (December 2013).

Element 9: Records

A master list is kept and the new utility billing software has fields to record the information for the service address.

Element 10: Reclaimed Water Requirements

We do not distribute or have facilities that receive reclaimed water.

8.6 RECORD KEEPING AND REPORTING

Water quality and compliance records are kept at the Public Works department in keeping with WAC 246-290-480. Some data such as operational, maintenance and customer complaints are noted for utility improvement and program purposes. Some operational records of the utility also fall under the local government general records retention schedule by the State Archives Office. As an indirect effort to reduce duplication and retention efforts, DOH has some analyses kept in their water system data base, Sentry Internet.

The requirements applicable to our system are summarized in Table 8.5 and in accordance with ODW Publication #331-431

TABLE 8.5 – RETENTION OF RECORDS			
RECORD	RETENTION PERIOD	COUNTY DEPT.	REGULATORY AGENCY
Bacteriological Analysis	5 years	LCPW	DOH
Turbidity Analysis	5 years	LCPW	DOH
Chemical Analysis	As long as the system is in operation	LCPW	DOH
Lead and Copper	12 years	LCPW	DOH
Monitoring Plans (bacteriological and turbidity analyses)	5 years	LCPW	DOH
Monitoring Plans (chemical analysis)	10 years	LCPW	DOH
Records of Action Taken to Correct Violations	At least 10 years after the last action taken for that violation	LCPW	DOH
Records of Granted Variance or Exemption	5 years from date of expiration	LCPW	DOH
Sanitary Surveys (written reports, summaries, communication)	10 years after completed sanitary survey date.	LCPW	DOH
Stage 2 Disinfection Byproducts Rule			LCPW
• Initial Distribution System Evaluation reports	10 years	LCPW	DOH
• Monitoring Plans	As long as the corresponding	LCPW	DOH

	monitoring occurs. Keep the previous monitoring plan for 10 years.		
• Monitoring Results	10 years	LCPW	DOH
Chlorine Residual	3 years	LCPW	DOH
Public Notices	At least 10 years after issued	LCPW	DOH
Consumer Confidence Reports	3 years	LCPW	DOH
Water Treatment Plant Performance			
• Type and quantity of chemicals used	3 years	LCPW	DOH
• Amount of treated water	3 years	LCPW	DOH
• Results of analyses	3 years	LCPW	DOH
Capital Project Reports and As-Built	Life of the facility	LCPW	DOH
Cross-Connection Control Records, WAC 246-290-490(8)			
• Master list of service connections or consumer's premises	Life of cross-connection hazard from premises	LCPW	DOH
• Inventory information of approved, installed backflow preventers	5 years	LCPW	DOH
• Backflow incident and annual summary reports	5 years	LCPW	DOH
Meter Readings for Usage	3 years	LC FISCAL	State Archives
Billing Statements	6 years	LC FISCAL	State Archives
Billing Summaries	6 years	LC FISCAL	State Archives
Billing Stubs	4 years	LC FISCAL	State Archives
Delinquent Account Lists	6 years	LC FISCAL	State Archives
Customer Account Adjustments	6 years	LC FISCAL	State Archives
Low Income/Senior Citizen Discount Applications	6 years 1 year (not approved)	LC FISCAL	State Archives
RECORD	RETENTION PERIOD	COUNTY DEPT.	REGULATORY AGENCY
Collection Agency Reports	4 years or completion of SAO report	LC FISCAL	State Archives
Uncollectable Account Lists	6 years	LC FISCAL	State Archives
Deposit Receipts	6 years	LC FISCAL	State Archives
Deposit Register	6 years	LC FISCAL	State Archives

LCPW = Lewis County Dept of Public Works

SAO = Office of the State Auditor

Records Retention Reminder

Public water system owners and operators must keep at their utility, or a nearby location, the following records for the minimum timeframes listed below:

- ☐ **Microbial and turbidity analyses:** 5 years.
- ☐ **Chemical analysis (IOC, VOC, SOC and so on):** As long as the system is in operation.
- ☐ **Copies of monitoring plans:** As long as the corresponding monitoring occurs. Keep replaced plans **5 years** for microbial and turbidity analysis and **10 years** for chemical analyses.
- ☐ **Records of action the system takes to correct violations:** At least **10 years** after the last action taken for that violation.
- ☐ **Copies of written reports, summaries or communications relating to sanitary surveys** conducted by the state, local health jurisdiction, or contracted third party: **10 years** after the sanitary survey is completed.
- ☐ **Records concerning a variance or exemption** granted to the system: **5 years** after the variance or exemption expires.
- ☐ **Copies of public notices:** At least **10 years** after issued.
- ☐ **Copies of Consumer Confidence Reports:** **3 years**.
- ☐ **Lead/Copper:** Keep original records of all sampling data and analyses, reports, surveys, letters, evaluations, and schedules for **12 years**.
- ☐ **Groundwater Rule:** Systems required to perform compliance monitoring must also keep:
 - Records of the state-specified minimum disinfectant residual: **10 years**.
 - Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the state-prescribed minimum residual disinfectant concentration: **5 years**.
 - Records of state-specified compliance requirements for membrane filtration and parameters for alternative treatment: **5 years**.
 - Records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements: **5 years**.
- ☐ **Stage 2 Disinfection Byproducts Rule:**
 - Initial Distribution System Evaluation (IDSE) reports: **10 years**.
 - Compliance monitoring results: **10 years**.
 - Compliance monitoring plans: As long as the corresponding monitoring occurs. Keep the previous monitoring plan for **10 years**.

- ☐ **Enhanced filtration and disinfection for surface water and GWI systems:** If your system is subject to the rule requirement in the first column of this table, you must keep the following.

Rule Requirement	Necessary records	Time records must be kept
Individual Filter Turbidity Requirements	Results of individual filter monitoring	3 years
Disinfection Profiling	Results of profiling (including raw data and analysis)	Indefinitely
Disinfection Benchmarking	Benchmark (including raw data and analysis)	Indefinitely

- ☐ **Enhanced Treatment for Cryptosporidium**
 - Keep results from the initial round of source water monitoring and the second round of source water monitoring until **3 years** after bin classification for filtered systems, or a determination of the mean Cryptosporidium level for unfiltered systems for the particular round of monitoring.
 - Keep any notification to the state that the system will not conduct source water monitoring due to meeting the criteria for **3 years**.
 - Keep the results of treatment monitoring associated with microbial toolbox options and with uncovered finished water reservoirs for **3 years**.

If you were confused about how long to keep your records, you can start from this point forward based on the information in this document.

Our publications are online at <https://fortress.wa.gov/doh/eh/dw/publications/publications.cfm>

For people with disabilities, this document is available on request in other formats. To submit a request, call 800-525-0127. For TTY/TDD, dial 711.

November 2015
DOH 331-431
Revised



8.7 WATER SHORTAGE RESPONSE PLANNING

Emergency response planning is an important element of water system reliability. Part of emergency response planning is the development of a Water Shortage Response Plan (WSRP) that outlines actions to take during various levels of water shortages. During minor shortages, only public information and voluntary conservation measures may be necessary; whereas, during extreme shortages, mandatory curtailment and rationing may be needed.

Having a WSRP provides us with an established plan on how to address shortages. It provides information to our customers on how to reduce water usage and expectations if the shortages become more severe.

Our WSRP is provided in Appendix I. The plan provides a four-stage approach to addressing a water supply shortfall event. Each stage provides an increasingly aggressive set of actions to take as the shortages become more severe. The four stages are:

1. **Advisory Stage.** We inform our customers that a water shortage may occur and encourage them to use water wisely.
2. **Voluntary Stage.** We implement supply-side actions and recommend voluntary actions to our customers to meet our demand reduction goals.
3. **Mandatory Stage.** We implement more aggressive supply-side actions and will limit or curtail certain retail water use activities.
4. **Emergency Stage.** If supply conditions worsen and the mandatory stage activities do not meet our demand reduction goals, we will implement emergency restrictions which may include rate surcharges.

The authority to implement the WSRP is given in Title 13 of the LCC with administration by the Director of Public Works.